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WAR AND TELEGRAPHY.

It is vexing, even saddening, to think how large an amount of discovery, invention, and skill is applied to the murderous purposes of war. As we advance in civilisation, armies become larger and larger, and more abundantly supplied with agencies we would willingly see devoted to more peaceful purposes. Whether wars of race, wars of creed, wars of ambition, or wars of national vanity, the result is much about the same in this respect. Some consolars tell us that wars by-and-by will become so terrible as to check the desire to wage them: let us hope so, despite present symptoms.

Science has unquestionably rendered a vast amount of aid to attack and defence in war within the last few years. Gunpowder, gun-cotton, dynamite, and other explosive substances for fire-arms, torpedoes, and military mining have had their properties and relative powers investigated with remarkable completeness. Gun-carriages have been so vastly improved, that by Captain Scott's contrivances a six-hundred-pounder can be managed as easily and quickly as a thirty-two-pounder could in the days of our fathers or grandfathers; while by Major Moncrieff's automatic apparatus a gun lowers itself behind the screen of a parapet or earthen battery for loading, and then raises itself twelve or fifteen feet to fire over it.

Photography, again, is applied in a great variety of ways to aid warlike operations. At the office of the Ordnance Survey, or under the supervision of the Director, an amazing number of such photographs are taken, enlarged or reduced from the original dimensions according to circumstances, and multiplied or prepared for printing by a very rapid process of zincography or some other kind of electro-engraving. One of the Reports issued by the Director tells us that he supplies the War Office with photographs of plans of battles, important fortified posts and their surrounding districts, barracks and forts in all parts of the British dominions, &c. All the equipments of troops for the field are similarly photographed or zincographed, as unerring patterns for reference. For such wars

as we have been engaged in during the past five-and-twenty years (happily few in number), such as the Crimean, Abyssinian, and Ashanti campaigns, photographs and zincographs have been supplied in large number to the officers, illustrating all details which the home authorities have been able to ascertain, and which are likely to be useful in the intended operations.

What are we to say of the *torpedo*, and its management by electricity? This is really a wonderful subject, the influence of which on future naval warfare even the most skilled and experienced officers can only dimly surmise. We know that during the civil war in America, the Federal torpedoes wrought more destruction on the Confederate ships than all the guns in the Federal fleet; that, on the other hand, the Confederate torpedoes so effectually guarded the approach to Richmond up James River, that a hostile flotilla was compelled to retire baffled and disappointed. One unlucky Federal ship unwittingly passed over a submerged torpedo at the moment of explosion. And with what result? 'The hull of the ship was visibly lifted out of the water, the boiler exploded, the smoke-funnels were carried away, and the crew projected into the air with extreme velocity. Out of the crew of one hundred and twenty-seven men, only three remained alive—the vessel itself being blown to atoms.' The arrangements have been so much improved since that time, that messages can be sent across a river or estuary from shore to shore through the very wire which is to discharge the torpedo! In every naval war during the last few years, torpedoes have been more or less employed. In what way the weaker Russian fleet has been able to baffle the stronger fleet of the Turks in the struggle of 1877, the newspapers have told us in full detail. There is no necessity for pursuing this part of the subject further, seeing that it was lately treated with some degree of fullness in our pages.

But the greatest marvel of all, in regard to the application of electricity to warlike purposes, is the *electric telegraph*. We know what service the lightning-messenger renders to society generally

in the peaceful daily maintenance of commercial and social intercommunication; and military men now know what a potent instrument it is in the conduct of field-operations and siege-works. An officer well qualified to judge affirms that the memorable Franco-German War, so disastrous to France, could not have been carried on without the aid of the electric telegraph by the German forces. The warlike struggles engaged in by various European powers in the Crimea, in India during the Mutiny, in China, in New Zealand, in the Austro-Italian provinces, in Morocco by the Spaniards, in America by the Federals and the Confederates, in Holstein during the brief Dano-German War, in Bohemia during the still briefer Austro-Prussian War, in Abyssinia, in France during the struggle against the Germans, in Ashanti—all these were marked by the adoption of the electric telegraph to a greater or less extent.

Many of us remember, from the vivid descriptions written by the special correspondents of the daily newspapers, how terrible were the sufferings of the British troops in the Crimea during the winter of 1854-5, engaged in trench-work and other siege-operations under almost every kind of privation. But we also know how impossible it would have been to learn the news quickly in England and to send instructions, without the aid of telegraphy. An electric cable was for this very purpose submerged in the Black Sea from the Turkish mainland to the Crimea; while on land, wires were set up from Balaklava to the headquarters outside Sebastopol. Thus it was that daily messages could be exchanged between Lord Raglan's headquarters and the War Office in London—also between the special correspondents of the daily papers and their employers in Fleet Street or Printing House Square. So in like manner, during the struggle arising out of the Indian Mutiny, the advancing British columns contrived, wherever possible, to maintain unbroken telegraphic communication with Calcutta, whereby the viceroy was kept informed of what was going on. Of course the mutineers or rebels destroyed or disrupted the wires wherever and whenever they could; and to repair the damage thus inflicted formed no small part of the arduous duties of the British officers.

Our little but expensive war in Abyssinia in 1868, marked by a less shedding of blood than almost any other war in modern times, was an engineers' war from first to last. A wild and unknown country was surveyed and accurately mapped out, four hundred miles of road constructed, tube-wells sunk, photographs of various useful kinds taken, and a telegraphic system established. The telegraphic arrangements first made had to be abandoned, owing to the scantiness of the facilities for transporting the necessary materials. The more restricted plan actually adopted was difficult enough, so limited were the means of obtaining wood for telegraph poles. On approaching Magdala, however, Captain St John

(who had the management of this part of the engineering) succeeded in laying down from five to ten miles a day. Short as was the war, this telegraph conveyed more than seven thousand eight hundred messages during the five months of its working, and aided most materially in giving effect to General (now Lord) Napier's well-planned and successful scheme of operations.

Our strange Ashanti War gave further evidence of the formation of a telegraph line through a wild country inhabited by a barbarous people. Lieutenant Jekyll, who had the management of this work, has given a lively account of the difficulties that beset him, and his mode of overcoming them. It was at first intended to fight the war with native levies and to lay down a railway; but Sir Garnet Wolseley, on landing to take the command, soon found that the natives were not sufficiently reliable, that the country was almost impracticable for a railway, that he must have English troops, and that an electric telegraph would be a highly useful aid. Lieutenant Jekyll, with a small staff, went inland and bought bamboo canes of the blacks, set them up as posts, and laid his wires from Cape Coast Castle to Coomassie at the rate of about two miles a day. A gang of fifty natives helped him. Of these worthies he says: 'They were not promising in appearance, and I was compelled to dispense with the services of those who were *less than four feet high*! (We italicise these words to shew what pigmies many of the West Africans are.) But they had with them an intelligent headman; and by dint of supervision, supplemented by a little flogging once now and then, turned out a tolerably useful body for light work, as niggers go.' The line was extended by degrees as far as Accrofumum, about a hundred miles from the coast. An amusing proof was afforded of the tendency of the natives to regard the telegraph as a kind of fetish, charm, or spell. The English one day saw bits of white cotton-thread suspended from tree to tree for several miles, as if to obtain thereby some of the mysterious benefits which the white man evidently expected from the wire. When the native helpers received small electric shocks occasionally, consequent on the testing or using of the line, they made sure that a charm was at work; and the lieutenant was half afraid his men would run away in terror. The climate was very trying to the English, who, lying ill with fever, got the natives to rouse them when any movements of the receiving apparatus were observed. Nevertheless, this telegraphic line rendered services much more than compensatory for the expense, difficulty, and anxiety of laying, maintaining, and using it.

The truly wonderful and eventful Franco-German War of 1870-1 exhibited the value of electro-telegraphy with a completeness never equalled before or since. A foretaste had been given in the Austro-Prussian or 'Seven Weeks' War' of 1866; when four complete and distinct telegraphic organisations were adopted—one with

Prince Frederick-William's fine army; one with that of Prince Charles; one at the king's headquarters; and one in reserve. Each could lay down wires as fast as the headquarters could advance. The speedy termination of the war averted the necessity of constructing field-telegraphs, such as those about to be described.

When the German forces advanced to Paris in the closing months of 1870, the plan pursued with the telegraph was as follows: The ordinary commercial and railway telegraphs were gradually extended over the frontier into France, as the German armies advanced. The field or *étappen* telegraphs maintained communication between the base of operations, the ammunition dépôts, and the advanced columns of the various army corps. When the sappers and miners had pushed on to the vicinity of Paris, the ubiquitous wire travelled with them. The materials used were light and simple; the operators employed to transmit and receive messages had been trained in the state establishments; and headquarters were kept instantly informed of any observed movements on the part of the French. The telegraph was indeed in constant use by the Germans—for arranging the transport of ammunition; for hourly communication with the commissariat; for directing the conveyance to Germany of sick and wounded, as well as prisoners; for regulating the traffic on the field railways; for maintaining unbroken connection between the troops, which formed a belt of ninety miles' circumference around Paris; for summoning reinforcements to any point where suddenly needed; and to send news of any gap in the continuity of the immense ring of soldiers encircling the beleaguered city.

If any evidence were needed of the invaluable services rendered by the electric telegraph in the war just noticed, it was furnished by M. Von Chauvin, who attended before a Committee of the House of Commons on Postal Telegraphs in 1876. He stated in distinct terms that the war could not have been carried on without this potent aid.

Our own English system of war telegraphy, organised at Chatham, has been improved from time to time. Light iron telegraph poles are provided, to support insulated wires. There is a travelling office on wheels for the operators; while the materials are carried in specially constructed wagons. So strong is the wire that wheels may go over it; and therefore the line is laid above ground or on the ground according to circumstances. Spikes of peculiar form enable the wires to be hung on trees or walls to meet the contingencies of towns and villages. The nucleus of the staff of operators is a small body of Royal Engineers, under their own officers, comprising about fifty military men, with occasional assistance from others—well organised into superintendents, inspectors, clerks, linesmen, storemen, artisans, and labourers. The wagons for materials contain drums on which the wire is coiled; this is unrolled as the wagon moves on, which is as fast as the operators can lay the line. At the present time, ten thousand miles of prepared wire are said to be kept in store, ready for any exigencies.

We might go on to notice the aid furnished to warlike operations by the electric light; as for instance, at Paris in the closing weeks of 1870, when such a light on Montmartre enabled the

Parisians to gather some knowledge of what the besiegers were about at night. But enough: the brief summary above given will suffice to shew how electricity is used in war.

NEARLY WRECKED.

CHAPTER III.—WILFRED'S LETTER.

TIME went by, and nothing happened to justify Mabel's fears. Wilfred seemed to be working hard and getting on well. His talent was pronounced unmistakable by the master under whom he was placed, and he himself was in good spirits about his future. But before very long matters began to change. His letters to Mabel were less frequent and shorter than they had been; he spoke with less openness and frankness of his doings; and it was evident to her that there was a *something* which he was careful to keep from her.

She longed to see Mr Merton, to hear from him what news he had of his son, and whether his ideas about Wilfred corresponded with her own; but she dared not speak to him about it. She knew how hard he had always been to Wilfred, how intolerant of all his faults; and she knew well there would be little mercy to be hoped for him at his father's hands if, as she suspected, he had been taking more to pleasure and less to work lately. She dared not even speak to her father of what she feared, for could she expect even him to think as leniently of her dear one as she did? So she had to go on from day to day keeping her trouble—which was not less difficult to bear because it was only suspected—to herself.

At last, when Wilfred had been about nine months in Paris, but too certain proof arrived of how true her suspicions had been. Mr Colherne was staying away from home—a very unusual proceeding, and Mabel was left alone. He had gone to pass a few days with a friend in Scotland, whither it had been impracticable for his daughter to accompany him.

The morning after his departure, Mabel came down to breakfast rather later than usual, singing a snatch of one of her favourite ditties, and burst open the dining-room door in a way that was indicative of her lively feelings. Her eye lighted upon a letter that was lying in her plate; the writing was that of Wilfred Merton. The missive was almost illegible and very brief, and acted upon her gay spirits like a sudden freezing. It ran as follows:

MY DARLING MABEL—I must write a few words, the last you will ever have from me, to tell you that whatever may appear, however any one may try to persuade you, I still love you; love you, as I have done all my life, with all the best part of my nature. Believe that, Mabel, my own, always. I write to say good-bye, for I shall never see you again; and yet I never longed to see you as I do at this moment. I feel half mad now, and hardly know what I am writing. How shall I say it; I have nothing to live for, except disgrace, and I will not live for that, I am resolved. Once more, good-bye, dearest and best. Try to forgive me, and then forget me, as every one else in the world will soon do.

WILFRED MERTON.

For an instant Mabel sat quite still, gazing straight before her with one expression, that of blank despair, upon her face. This sudden fearful shock had quite stunned her. But she was not a girl to remain inactive, simply grieving over misfortune, when there was anything to be done. Her resolution was promptly taken. She rang, and a servant appeared.

'Tell Hawkesley to bring the brougham round as soon as he possibly can,' she said; 'tell him not to mind how it looks, but to be at the door as soon as possible.'

'Is anything the matter, miss?' said the man, astonished at this order.

'Yes. I have no time to lose.'

'Is it master, miss?' he asked, with that dreadful habit of his class of questioning instead of doing what is wanted.

'No; papa is quite well. But don't stop now; go yourself to the stable; I haven't a minute to waste.'

In a few minutes more she was seated in the brougham which was fast making its way to Mr Merton's bank in the City.

CHAPTER IV.—THE JOURNEY.

Mr Merton was sitting in the private office of his counting-house with a large book open before him. Just as he was in the middle of some calculation which, to judge from the expression of his face, was pretty abstruse, the door opened and a clerk entered. The banker looked up with no appearance of being pleased at the interruption.

'What is it, Mr Chester?' he said, rather angrily.

'There is a young lady, sir, who says she must see you as soon as possible, and alone.'

'O nonsense. I can't possibly attend to her. Don't you know who she is?'

'No, sir; she wouldn't give me her name, nor tell me her business. I said that I was sure you couldn't see her; but she said it was absolutely necessary that you should do so, and that you would know her directly.'

'You must tell her that it is out of the question for me to see her, if she will not send word who she is, or what she wants.'

'There's no good, sir; I have told her so. But she is quite determined to come; and I thought I had better speak to you, as it seemed so strange to have her waiting about there.'

'Well, in that case I suppose you must shew her in.'

The clerk withdrew, and in an instant returned with a young lady who had a thick veil over her face. Having ushered her into the room, he withdrew and shut the door, leaving Mr Merton and his visitor alone.

No sooner was the door closed than the lady put up her veil and disclosed the features of Mabel Colherne.

'Why, Mabel!' said Mr Merton, appearing considerably more surprised than pleased at finding who his visitor was; 'what in the world brings you here?'

Mabel for her only answer put Wilfred's letter into his father's hands. He read it through without shewing any signs of either surprise or regret, and when he had finished it, handed it back to her without speaking.

'Well, Mr Merton?' she said, feeling impatient at his silence.

'Well, Mabel?' he returned.

'Have you read the letter?'

'Most certainly.'

'And have you nothing to say?'

'What am I to say?'

'Mr Merton,' exclaimed Mabel, hardly able to control herself, 'can you read such a letter from your son, and not care about it?'

'I have given up thinking of Wilfred as my son at all, Mabel. I gave him the chance of rising in his odious profession by sending him to Paris, and what has been his conduct in return for my kindness? He has done nothing but amuse himself, and get into all kinds of disreputable mischief. I should have told you all this before, and tried to persuade you to break off with him; but I did not do so; in the first place, because I was sure you would not listen to me; and in the second, because I did not want to be the means of cutting him off from your affection, and thus rendering his amendment impossible.'

'I have been afraid that something has been going wrong with Wilfred lately. I wish you had told me before; I might have been able to influence him for good.'

'I don't believe that any influence in the world would be useful to him; he is a thoroughly worthless fellow. I paid his debts once upon condition that he would contract no more, but I might have saved myself the trouble; within a month he wanted more money. I was not going to be guilty a second time of the weakness of saving him from difficulties he had brought upon himself, in spite too of all my warnings; so I wrote back to say that I would have no more to do with him.'

'Mr Merton, you will not keep to such a cruel resolution now, with such a letter as this before you?'

'Are you so weak, Mabel, as to be taken in by such nonsense as this? Don't you see that being unable to get at me, he is simply trying what he can do with you?'

'No, Mr Merton; I don't believe that, and won't for a moment. I trust my own instinct, which is a woman's natural guide, and generally a very sure one, and I am certain that Wilfred intends doing something desperate.'

'I have told you before now that my son is a foolish weak fellow, and not worth anybody's love.'

'What is that to me, Mr Merton?' exclaimed Mabel, exasperated beyond endurance. 'I love him, and I can hardly be expected to stand quietly by and let him be ruined, because the affection you ought to bear your son is wanting in your nature. Who knows but that the treatment he thus received under his own father's roof may have—'

'What do you wish me to do? What is there that can be done?' cried Mr Merton, interrupting the girl's impassioned burst.

'I want you to go with me to Paris to see Wilfred, that we may take him away from harm, if it be not too late. If papa had been at home now, he would, I am sure, have gone with me; but I could not wait till he comes.'

'You can hardly be serious in proposing for me to go on such a wild expedition as that, I think!'

'Mr Merton, I am quite sure that that letter means more than you think; and I am determined that he shall not be left to be ruined without an attempt to save him. If you will not come I must and will go alone.'

'You are mad, Mabel! Go to Paris alone, and to see this worthless fellow! What do you suppose the world would say of such conduct?'

'I can't think of that when the person I love best on earth is in such danger, as I am sure Wilfred is now, and there is a chance, however faint it may be, of my saving him. I can answer to heaven and my own conscience for what I am going to do, and I must brave the world. I shall write and tell papa what I have done, and I am sure that he will follow me as soon as possible. Good-bye, Mr Merton; there is no use in my stopping here longer.'

'Stay, Mabel!' he began, detaining her as she rose. 'I cannot possibly allow you to go alone, and I have of course no power of interfering with your actions. If you really are bent upon this scheme, which I still think an utterly mad one, I must, for the sake of my own reputation as much as for yours, accompany you.'

'Believe me that my fears are not uncalled for. I am sure something dreadful is going to happen to Wilfred, and I only dread being too late even now. I am very thankful you are going with me; and am certain that you will never repent it.'

'No thanks: it is only necessity that makes me do it. When do you start?'

'To-night, if possible.'

Mr Merton looked into a Bradshaw that was lying upon the table. 'The train to meet the night-boat leaves London at half-past eight; to catch that you must start from your house at half-past seven.'

'I will do that. Will you meet me at the station?'

'Yes; I will be there at a quarter past eight.'

'Good-bye till then; and thank you again a thousand times.'

Mr Merton attended her to the outer door of the office, and she drove home well satisfied with her mission. Writing to her father, to tell him everything, and what she was going to do, she packed a small box to take with her, and then did little else but wish the day, which seemed interminable, gone. Long before it was necessary, she was at the station; and punctual to the appointed minute, Mr Merton appeared.

After a journey that to Mabel seemed endless, they at length reached Paris, and drove straight to the hotel in which Wilfred lived.

As they stopped, Mr Merton said: 'You may depend upon it we shall find our trouble wasted, and that the object of your anxiety is out somewhere amusing himself.'

Mabel did not answer. She could hear her heart beat as she sprang out of the cab; and without waiting for her companion, entered the court-yard of the hotel, and went to the den appropriated to the *concierge*. That gentleman was reading a newspaper, in which he seemed much interested, and did not look up as she came near him.

'Monsieur Merton, est-il chez-lui?' she asked breathlessly.

The *concierge* put his finger against the word he was reading, in mute protest against being interrupted, and looking slowly up, said rather dreamily: 'Plait-il, Madame?'

'Monsieur Merton, est-il chez-lui?' she repeated more eagerly than before.

The man turned round, and walking with the most provoking deliberation to the other end of the room, where numerous keys were hanging,

looked at the place appropriated to the one belonging to Wilfred's room, and seeing that it was unoccupied, came back to Mabel and answered: 'Oui, Madame.'

'Quel est le numéro de sa chambre?'

'Soixante-deux, au cinquième,' said the *concierge*, returning to his paper as he finished speaking.

Mr Merton had paid the driver and joined Mabel as this conversation came to an end, and they started to mount the stairs to the fifth floor as directed.

Even Mabel's youth and energy could not prevent her from getting out of breath in that long climb; and by the time she and Mr Merton had arrived at the fourth floor, they were obliged to stop and rest.

Before they had stood an instant, they were startled by a loud report of a pistol coming from the floor above them. With a loud scream, Mabel sped up the remaining stairs and entered the room named by the *concierge*.

Mr Merton came almost instantly after her, and found Wilfred lying insensible on the floor, and Mabel kneeling by his side, trying to restore consciousness.

CHAPTER V.—SAVED.

Within an hour, two of the most skilful physicians that Paris could boast were with Wilfred Merton. And when they left him, their verdict was not one to give much hope. He had shot himself in the chest, and it was very doubtful whether he would recover from that fearful self-inflicted wound.

Mr Merton's anguish during those long days and nights while Wilfred lay at death's door was terrible to behold. Alienated as had been his affection for his son while absent, the feelings of parental love returned tenfold, now that he might be on the point of losing that son for ever; and as he nursed his boy with that womanly gentleness which is so touching in a man, it was evident that his whole hope of happiness was bound up in his recovery.

Mr Colherne had, as Mabel predicted, lost no time in following her to Paris, and though he could hardly feel the intense and painful interest in the invalid that his father felt, still for Mabel's sake he became a willing sharer in the nursing.

As for Mabel, hope was very strong in her, and made that time of watching much easier to bear. She could not help believing that that strong determination to cross the Channel had been put into her mind to enable her to save the one who was so dear to her; and in that belief she put her trust.

At last, after long, weary, sometimes almost despairing watching, the patient took a favourable turn. The burning fever ceased; and one day the doctor told the anxious watchers that there was great hope; that indeed, unless any unforeseen complications arose, there was nothing further to fear.

Then the pent-up feelings of Mr Merton—that grief which he had tried so unsuccessfully to conceal from his companions, could be kept in no longer; he threw his arms round Mabel's neck, buried his face on her shoulder, and burst into tears, those tears which, when shed by a man, are so inexpressibly painful to see.

'Mabel,' he said, 'I owe all this to you; if it had not been for you, I should have been my son's murderer.'

Mabel pressed her lips upon his forehead in silence; her heart was too full of thankfulness for speech.

Wilfred was very patient, and manfully bore all the trials of the time. As soon as he was well enough to be able to think of what he had done, a feeling of intense remorse had come over him, and had taken such powerful hold that at first it threatened to throw him back. But the gentle hand of Mabel was a wonderful restorer; a word or two of loving assurance changed this bitter remorse into a quiet sorrow. It happened one day, about a week after this, that while Mabel was reading at the window of the invalid's room, she heard Wilfred's voice gently calling to her. It was as if the voice of her lover had been suddenly restored to him.

'Can you forgive me, my darling?' he asked.

'Am I not a woman, Wilfred? And is it not a woman's privilege to forgive?'

'I don't think you are a woman, Mabel; I think you are an angel.' Few words, but conveying volumes.

From that moment her lover began to mend steadily, though still slowly; every day there was more and more to hope, until at length Wilfred was pronounced wholly out of danger. And then one evening in the dusk, when the lamps were being lighted in the street below them, and the increased hum and buzz of the later day were coming on, Wilfred and Mabel found themselves again alone.

'Mabel,' he said in a low voice, when they had been quite silent for a long time, 'I have been wanting an opportunity to tell you all the wrong that I have done. Shall I tell you now?'

'Yes, Wilfred, now—in this twilight light.' She slid her hand into his as she spoke, and they remained in that position while he told her his story.

There was nothing new about it; it was the old story. Led by bad companions into temptations, his naturally lively and weak nature was not able to resist; ashamed of himself for his own conduct when he found himself outrunning his allowance, and obliged to apply to his father for help. Thrown into despair by his father's harsh conduct to him, he had plunged still more wildly into the excesses and dissipations of his leaders, till at last, horrified at what he was doing, and seeing no means of escape from the snares in which he had allowed himself to be caught, he had written that letter to Mabel; had waited, vaguely hoping for he knew not what, for some days, and had ultimately sought to put an end to himself in a fit of intense depression. Weakness, that shoal which is even more fatal, because more hidden than wickedness, had wrecked him, as it has wrecked so many. In the deep remorse that he now felt, he greatly exaggerated the wickedness of his conduct, for though he had been guilty of grievous folly, he had done no positive or irremediable wrong either to himself or others. The only actual definite sin he had committed was the suicidal one, from the consequences of which Mabel's resolution had happily saved him.

When he had finished this history, he paused an instant, and then added, without looking at her:

'And now, Mabel, that you have heard all this, do you still say that you forgive me? Can you still love me?'

'A love would be very useless, Wilfred, that deserted its object just when it was most wanted; I hope my love is a truer one than that.'

'Mabel, my beloved,' said he, drawing her closer to him as he spoke, 'if it had not been for you, I should have been beyond the power of repentance now. Your affection has saved me once, and it shall keep me from harm now, for ever!'

Before very many years had gone by, Wilfred Merton's name was known as that of a successful young painter. He and his wife were settled in London, and were able to live in very comfortable style. They had no children, which was their only serious drawback to happiness; but if ever Wilfred, seeing his wife look longingly at some merry group of little ones, and guessing her thoughts, tried to console her, she would put her hand into his and say, her truthful eyes looking full at him as she spoke: 'I have you, Wilfred, beside me, and I am content.'

The foregoing narrative, which is founded upon events which actually took place, may be turned to advantage by those parents who are prone to thwart the natural inclinations of their children, or cut them adrift without a proper guide. The career of many a man has been blighted by the mistaken, though perhaps well-meant policy of a father who, desirous to see his son follow up his own profession, has tried to compel that son to work contrary to his inclination, with results more or less disastrous.

GEMS AT RANDOM STRUNG.

THE history of precious stones, those beautiful objects which have strongly appealed to the imagination of men in all ages, has been written many times; and yet their latest chronicler is doubtless justified in assuming that the knowledge of them in its practical sense is not widespread; that even in the jeweller's trade there are many who are not skilled in detecting the real measure of difference between one stone and another, either by the specific gravity, which supplies the essential test, or by the minor tests of rarity and quality. In treating of the history and distinguishing characteristics of *Precious Stones and Gems*, Mr Streeter has certainly conferred a benefit on 'the trade;' to the general reader the book can hardly fail to be of interest, for it puts a captivating subject before him under a variety of aspects, and appeals successfully to imagination as well as to taste for exact knowledge.

From the magnificent specimens which the rescued Sindbad carried away with him when he tied himself with his turban to the roc's leg, on through a long succession of fable and of history, diamonds will never cease to enchant mankind, having always taken the lead in interest, as they have been supreme in value among those treasures of the mineral kingdom which are called gems or precious stones. Ages before men discovered that their beauty could be enhanced by handiwork, their rarity and their price had endowed them with a surpassing charm; and now, when handiwork has been brought almost to perfection, and science has dispelled the mystery with which

the diamond was invested, they maintain their immemorial supremacy. In company with Mr Streeter we may trace the beautiful things from their habitat in India, the Brazils, South Africa, the Ural Mountains, and Australia, through their history in the ancient times and in mediæval days, when they formed the theme of many fables and the object of much superstition.

The diamond dwells in the same lands and in the same strata with many other gems, but it is the most precious as it is the most difficult to find; and though its nature resembles theirs in many respects, in one it is unique—it is the hardest of all known substances, and belongs to those bodies which refract light most strongly. Its magnifying power is greater than that of glass; but it is seldom used for microscopic lenses, owing to the great difficulty of making them perfectly accurate. It was believed to possess double refraction, but that has been disproved; and the deviation which gave rise to the error is traced to the existence of internal air-bubbles, as in amber, by which the course of the light is altered. It is the triumph of cutting to exhibit these qualities to the highest degree, and thus did Babinet, a great authority on diamonds, test them. 'In a sheet of white paper he bored a hole somewhat larger than the diamond to be tested: he let a ray of sunlight pass through the hole, and holding the diamond a little distance from it, yet at such an angle as to allow the ray to alight on a point of the flat facet, he found this facet to be forthwith represented on the paper as a white figure, whilst all around little rainbow circles were delineated. If the observer found the primary colours red, yellow, and blue definitely separated one from the other in these little circles, and if their number were considerable, and they stood at equal distances from each other, then he pronounced the brilliant to be well cut.'

From Mr Streeter we learn that in commercial estimation, coloured gems stand far behind the diamond; inasmuch, he tells us, that this stone represents ninety per cent., and the others altogether only ten per cent. of the quantity on sale. A hundred years ago, Brazil became the rival of India in the production of diamonds, and the finders were the poor mulattos and negroes, who explored for them the sterile wilds of Minas-Novas, and sold them to the merchants. The story of the discovery of these gems at Bahia is as follows: A slave who came from Minas-Gerâes was tending his master's flocks in Bahia, and he noticed that the soil resembled that of his native place. He groped in the sand and found seven hundred carats of diamonds. He ran away, and offered the gems for sale in a distant city. Of course such wealth in the hands of a slave aroused suspicion, and the negro was arrested and sent back to his master, who tried in vain to come at a knowledge of his secret. At last he bethought him of sending the slave again to tend his flocks at Bahia, and he watched him. Again the slave-shepherd groped in the gem-hiding sand, and the truth was discovered. Then came numbers of wealth-seekers from Minas-Gerâes and other parts of Brazil, so that the next year twenty-five thousand men were diamond-hunting in Bahia, and the amount daily obtained for some time rose to one thousand four hundred and fifty carats. The trade was a

prerogative of the Portuguese crown, and Lisbon was the chief emporium of the gems. The precious things are of fluctuating value. In 1836 they were very dear; but in 1848 the price fell; and a few years ago there was 'a glut in the market,' in consequence of Dom Pedro's having paid the Brazilian state debt to England in diamonds instead of money, when the price fell fifty per cent. in the Leipsic market.

Mr Streeter, who has great faith in the future of Queensland as a diamond-field, gives a most interesting account of the discoveries in New South Wales, that wonderful colony, whose long-delayed luck has come at last, and from all sides at once; but dwells at length and with exultation upon the Cape diamond-fields. 'South Africa,' he says, 'is richer, and its produce is far more to the purpose of modern history, and to the supply of the precious stones, which form our wealth of gems, than the old diamond-fields of the East or West.' The history of the discovery of gems in the colonies partakes of the romance which attended the discovery of gold; and is not free from the tradition of crime and misfortune, which rests upon similar revelations in the Old World. Idle as are the superstitions which impute specific evil influences to certain gems, it is not to be denied that there have been many instances of 'fatal jewels;' and that cruelty, injustice, and terrible human suffering have attended the rifling of the earth's bosom for those mysterious treasures formed by her wonderful chemistry from an invisible component of the atmosphere. Many of the strange stories of mediæval alchemists deal with the attempt to make diamonds, and Mr Streeter tells us of the experiments which have determined their nature and combustibility. There is a fascination to the imagination in the following description of the burning of diamonds:

'In 1750 the Emperor Francis I., at Vienna, subjected, in the presence of the chemist Darzet, diamonds and rubies worth six thousand florins to the heat of a smelting-furnace for twenty-four hours. The diamonds were found to have totally disappeared; but the rubies remained, and appeared much more beautiful than before. In 1771 a magnificent diamond was burned at Paris in the laboratory of the chemist Macquer. Hence arose a great discussion. The diamond had disappeared; but whither? Had it volatilised? Had it burned? Had it exploded? No one could say. Then stepped forward a celebrated jeweller, by name Le Blanc, who asserted the indestructibility of the diamond in the furnace, stating that he had often placed diamonds in an intense fire to purify them from certain blemishes, and that they had never suffered the smallest injury.' (This has been done also by Mr Streeter with similar results.) 'The chemists D'Arcet and Bonelle then demanded of him that he should make the experiment on the spot in their presence. He took some diamonds, inclosed them in a mass of coal and lime in a crucible, and submitted them to the action of the fire. He had no doubt that he should find them safe. At the end of three hours, on looking into the crucible, they had utterly disappeared.'

Then appeared upon the scene the famous Lavoisier, he to whom the Convention refused a fortnight's reprieve from the guillotine, just as he was on the threshold of a probably sublime discovery in the science of light; Fouquier-

Tinville returning him for answer that the Republic had no need of chemists and *savants*. In the presence of Lavoisier, Maillard, another jeweller, took three diamonds and closely packed them in powdered charcoal in an earthen pipe-bowl in a strong fire; and when the pot was taken out, there lay the diamonds in the powdered charcoal untouched. It was, however, gradually discovered that it was only by entirely shutting out the air, and therefore the oxygen with which the carbon combines, that the diamonds were preserved from burning; whereas by the simple admission of air, of which oxygen is a constituent part, diamonds burn just the same as common coal. This was proved by Lavoisier in 1776; and Davy subsequently shewed that the diamond contains no hydrogen. So, when the most precious object which the earth produces is burned, the gas formed from its combustion is just that which our fires and our gas-burners yield, and our own bodies too, by the combustion which attends their living; and, says Mr Streeter, 'the old fable of the maiden from whose lips fell diamonds, may have a really scientific basis after all.' It takes immense heat to burn a diamond, and if it were possible to collect the black material which covers the surface during the process, it would be found to be simply soot.

The origin of the diamond is still a matter of scientific investigation and dispute; and the various opinions concerning it may be collected under two heads: (1) The diamond is formed immediately from carbon or carbonic acid by the action of heat. (2) It is formed from the gradual decomposition of vegetable matter. The various methods by which the supporters of the respective theories suppose the transformation to have been wrought, are full of interest and suggestion. In Brazil it was discovered that the matrix of the diamond is itacolumite, and it is said that the gems obtained from itacolumite sandstone have rounded angles and corners, whilst those from the sandy schist are perfect crystals. 'If,' says Mr Streeter, 'this be a fact, we must believe that the agency which changed the sandstone into itacolumite acted also on the diamond.'

Whether in the mines or by the rivers, whose 'golden sands' are flecked with gems, in rich Brazil, the labour of procuring these beautiful gems is great, and large specimens are rarely found; so rarely, that big diamonds have their histories—terrible histories too often—like heroes and race-horses. They are weighed by the carat, a word which Mr Streeter considers to have been derived from the name of a bean, a species of *Erythrina*, which grows in Africa. 'The tree which yields this fruit is called by the natives "kuara" (sun), and both blossom and fruit are of a golden colour. The bean when dried is nearly always of the same weight, and thus in very remote times it was used in Schangallas, the chief market of Africa, as a standard of weight for gold. The beans were afterwards imported into India, and were then used for weighing the diamond.' It is estimated that in ten thousand diamonds rarely more than one weighing twenty carats is met with, while possibly eight thousand of one carat or less may be encountered. An elaborate system of rewards and punishments is adopted in the Brazilian mining and river-searching works; but it is believed that in spite of this, one-third of

the produce is surreptitiously disposed of by the labourers.

The histories of those world-famous diamonds the Sancy, the Regent, the Koh-i-noor, the Blue (or Hope) diamond, and others, have been related before, and history and romance have dealt with the misery and crime, the evil passions and the mystic fancies, involved in the stories of some of these. In a few lines Mr Streeter gives a sketch of the Brazilian contribution to this many-chaptered story, which is not generally known. 'The discovery of these precious stones in 1746,' he says, 'proved a great curse to the poor inhabitants of the banks of the diamond rivers. Scarcely had the news of the discovery reached the government, ere they tried to secure the riches of these rivers for the crown. To effect this, the inhabitants were driven away from their houses to wild far-away places, and deprived of their little possessions. Nature itself seemed to take part against them: a dreadful drought, succeeded by a violent earthquake, increased their distress. Many of them perished; but those who lived to return on the 18th May 1805, were benevolently reinstated in their rightful possessions. Strange to say, on their return the earth seemed strewn with diamonds. Often the little ones would bring in between three and four carats of diamonds.'

Next to the diamond comes the oriental ruby, and in former days it was more prized than the gem, which has a genus all to itself. The ancients gave immense sums for fine specimens of the ruby variety of 'corundum,' or aluminous stone. In Benvenuto Cellini's time a perfect ruby of a carat weight cost eight hundred crowns, whilst a diamond of like weight cost only one hundred. The two most important rubies ever known in Europe were brought to England in 1875. One was a dark-coloured stone, cushion-shape, weighing thirty-seven carats; the other a blunt drop-shape of 47½ carats. Mr Streeter thinks that the London market would never have seen these truly royal gems but for the poverty of the Burmese government; and adds an interesting account of the estimation in which rubies are held in the distant Land of the White Elephant. The sale of the two rubies caused such excitement that a military guard had to escort the persons who conveyed the precious packet to the vessel. No regalia in Europe contains two such rubies. The smaller was sold abroad for ten thousand pounds; the larger has also found a purchaser, but Mr Streeter does not tell us at what price. The great ruby of the kings of Burmah is said to be as large as a pigeon's egg, and of wondrous quality; but is a treasure which no European eye has ever seen. Very few rubies pass out of the country; the king is excessively fond of these gems, and prohibits the export of them. The Burmese have strange notions about rubies; 'they believe that they ripen in the earth; that they are at first colourless and crude, and gradually become yellow, green, blue, and last of all red—this being considered the highest point of beauty and ripeness.'

The sapphire, the emerald, and the opal (the last erroneously supposed to exist in India, whereas it is found almost entirely in Hungary), the turquoise, and the cat's-eye (a rare variety of the chrysoberyl, and inferior in hardness to the diamond and sapphire only), are, each in

its turn, the subjects of Mr Streeter's lucid and learned exposition; after which he passes to the less valuable classes, pearls, onyx, and the gems used for engraving and other purposes. The increasing estimation in which the true Ceylonese cat's-eye is held (it is one of the most fashionable gems at present, and there are specimens in the market worth upwards of one thousand pounds), renders the following particularly interesting: 'In India the cat's-eye has always been much prized, and is held in peculiar veneration as a charm against witchcraft. It is the last jewel a Cingalese will part with. The specimens most esteemed by the Indians are those of a dark olive colour, having the ray so bright on each edge as to appear double. It is indeed wonderfully beautiful with its soft deep colour and mysterious gleaming streak, ever shifting, like a restless spirit, from side to side as the stone is moved; now glowing at one spot, now at another. No wonder that an imaginative and superstitious people regard it with awe and wonder, and believing it to be the abode of some "genius" or djinn, dedicate it to their gods as a sacred stone.'

THE INN AT BOLTON.

WHEN I was a little boy—I am now an old man of sixty—'Aunt Oliver,' as we used to call my father's widowed sister, was in the habit of paying long visits at my father's house. She had not long been a widow; and though past the meridian of life, was still a beautiful woman. But what made her so exceedingly popular with all my father's children was her repeated kindnesses, displayed to us in the shape of various useful and ornamental gifts, carefully chosen to suit our several ages and characters; but above all, her wonderful condescension in giving up her own pursuits on many a winter's night, that she might recount to us, as we sat grouped around the nursery fire, some of the incidents of her varied and eventful life. She had been a great traveller in her day, having been to Rome, and even visited the Holy Land; and what is more, she had written a book of travels! a circumstance which caused us to regard her with a strange curiosity almost amounting to awe; a feeling on our part which, but for her uniform kindness, might have detracted from that universal love we one and all bore towards her. One of my aunt's adventures made a strong impression on my youthful mind, and is even now, after a lapse of half a century, still fresh in my recollection. Thinking it might serve to divert those who have a fancy for the humorous, I have gathered up the threads of the story from the storehouse of my memory, and now present it in narrative form, under the foregoing title.

My uncle, Mr Oliver Brown, was in the iron trade; and in connection with his business, which was a very large one, was in the habit of paying periodical visits to the manufacturing town of Bolton, near to which his principal iron-works were situated. He usually paid these visits alone; but on the occasion of which I am about to speak he was accompanied by my aunt, who deemed it her duty to be with her husband, as it was winter-time and he had only just recovered from a severe illness. It was late in the evening of a bleak November day that the coach which conveyed Mr

and Mrs Oliver Brown from their comfortable country-seat, distant some fifty miles from Bolton, entered the noisy ill-paved streets of that bustling town, and proceeded to what at that period was the principal inn of the place. Both travellers were tired by their journey, and after a hasty dinner, were glad to retire to rest.

'Did you say number twenty-seven, second floor?' inquired Mrs Oliver, addressing the lady at the bar, as she took a chamber candlestick from her hand and proceeded to mount the stairs.

'Twenty-seven, second floor,' responded the landlady with an affirmative nod and a gracious smile.

'Twenty-seven, second floor,' repeated my uncle as he followed in the wake of his more active and enterprising helpmate, who, threading her way up the spiral staircase and along a labyrinth of corridors and passages, had already arrived at the dormitory in question. Mr and Mrs Oliver were soon in bed; and there we will leave them, whilst we look in at number twenty-nine on the same floor, and make the acquaintance of Mr and Mrs Wormwood Scrubbs, the occupants of that apartment. They, like their neighbours at number twenty-seven, were in comfortable circumstances, and like the latter, not much given to travelling for pleasure's sake on a cold raw day in November; but an affair of business which demanded their presence at Bolton had compelled them to sacrifice their ease and comfort, and come to that town on this bleak November day. Mr Scrubbs had long been subject to attacks of gout in the foot; and as he had heard of this disease having a tendency sometimes to shift its seat to the brain or the stomach, when it was apt to assume a more serious type, he had made it a rule to carry about his person in the daytime, and to place under his pillow at night, a certain medicine which an eminent physician had assured him would speedily arrest any such erratic tendency on the part of the malady from which he suffered.

Now, on this particular night, whether from over-exertion, exposure to cold, or some other cause I know not, Mr Scrubbs happened to be visited with certain premonitory symptoms of an approaching attack of gout, whereupon he instinctively felt under his pillow for the valuable specific I have referred to. He then remembered he had inadvertently left it in the pocket of his greatcoat, which he had thrown upon the sofa in the private sitting-room into which Mrs Scrubbs and himself had been ushered on their arrival at the inn; whereupon, being unwilling to disturb his better-half, who was in a profound sleep, he let himself quietly out of bed, and throwing his dressing-gown over his shoulders, proceeded to light his candle. Having done this, he gently opened the door and sallied forth, leaving the door slightly ajar, in order that he might the more easily find the room on his return.

It so chanced just about the time Mr Wormwood Scrubbs was proceeding on the above mission, that Mrs Oliver Brown, who was too fatigued to sleep, suddenly recollected that she had left her reticule with her purse inside it on the table in the room where she and Mr Brown had had their dinner; and wisely considering that it would not be prudent to leave it there till morning, she resolved to descend to the sitting-room and recover the bag at once; accordingly slipping out

of bed, she struck a light, and opening the bedroom door, stepped into the corridor into which it led. She then proceeded to assure herself by a reference to certain figures that were painted over the door-frames of the several dormitories that the room she had just quitted was number twenty-seven and no other; and having satisfied her mind on this point, she left the door ajar, and gliding swiftly along the different passages and down the cork-screw-shaped staircase, soon reached the sitting-room, whence, having found the bag she was in search of, she retraced her steps in the same rapid way, exercising her memory as she went along by repeating the number of the room to which she was returning.

Now Mrs Oliver Brown, who, by the way, had an undoubted bump for localities, had formed an idea—and a very correct idea it was—that number twenty-seven was the second room on the left-hand side of the corridor; but on her return, finding the door of this chamber closed, whilst that of the one adjoining it was open, she not unnaturally supposed she might have made a mistake in regard to the position of number twenty-seven; but in order to set all doubt at rest upon this point, she was about to refer to the number on the door-frame, when a sudden gust of wind sweeping along the whole length of the passage extinguished the candle, leaving her in utter darkness. Thus situated, Mrs Oliver Brown did what most ladies (and gentlemen also, I think) would have done under the circumstances: she groped her way along the passage till she came to the open door of number twenty-nine, went softly in, shut the door in the same quiet way, and got into bed, where, being greatly fatigued with all she had undergone, she soon fell fast asleep.

In the meantime, Mr Wormwood Scrubbs having repossessed himself of his gout mixture, had also returned to the corridor, where seeing a door ajar precisely as he had left his own, he at once went in, closed the door, blew out his candle, and popped into bed, where my excellent uncle was still sleeping as peacefully as a baby, and utterly unconscious of the recent migratory movements of Mrs Brown, which were destined to produce such an unlooked-for disturbance in the domestic arrangements of the two families occupying respectively numbers twenty-seven and twenty-nine.

Mr Wormwood Scrubbs, however, though now quite easy both in body and mind, was unable to sleep, and lay awake, first thinking of one thing and then of another, till he was suddenly recalled to the stern realities of life by hearing his wife's voice proceeding apparently from the adjoining room. In a state of immense perplexity, he struck out with his sound leg in the direction of the sleeping figure at his side, when having come in contact with a plump warm body corresponding to that of his amiable helpmate, he paused, and suspending all further investigation for the present, calmly awaited the issue of events. Nor had he very long to wait.

Mrs Wormwood Scrubbs was a lady of a highly nervous and excitable temperament, with whom, when once roused, it would be about as useless and dangerous an experiment to attempt to argue as with a tigress surrounded by a litter of famished cubs. She had just waked up from her first sleep, when happening to put her hand upon that part of the connubial couch where her Wormwood's head

was wont to rest, she found it brought in contact with a lace nightcap, and a profusion of long curls that had escaped from beneath it.

'Why, what's this, Scrubbs? What tomfoolery's this you're after? What's this, I say?' tugging, as she spoke, at the head-dress of her supposed husband. 'Why, goodness gracious, it isn't Scrubbs after all!'—as starting up in bed, my aunt in gentle but startled accents implored her to be quiet.

'But who are you? and what are you doing in number twenty-nine?'

'Number twenty-nine! Surely this is not twenty-nine, but twenty-seven,' doubtfully returned my aunt, as the idea suddenly flashed upon her that she *might* have mistaken the one room for the other. 'I think I can explain it all.'

'Explain it all! Of course you'll explain it all, and something more than that, before I've done with you, you good-for-nothing impudent hussy that you are!'

'For heaven's sake, be calm, my good woman, or you'll rouse the whole house,' expostulated my aunt in the gentlest manner possible.

'Don't "good-woman" me!' shouted Mrs Scrubbs at the top of her voice, as springing from the bed, she seized the bell-rope and pulled at it with a violence that threatened to carry everything with it. Amid this terrific uproar, Mr Scrubbs and his bed-fellow Mr Brown, who had been vainly trying to make themselves heard from the adjoining room, suddenly appeared candle in hand upon the scene.

As oil cast upon the troubled sea will instantly reduce that element to a state of the profoundest calm, so did the sudden appearance of Mr Scrubbs act as if by a charm to allay in one moment all the angry feelings of Bella Scrubbs, and where only a few moments before all was violence and discord, there now reigned perfect peace and good-will.

The mutual explanations that ensued, it is needless to say, were perfectly satisfactory to all the parties concerned; and after a readjustment of partners, the two families once more took possession of their respective chambers, where I need hardly say they were not again molested during the remaining part of that memorable November night.

ROCKBOUND.

Of the thousands of tourists who flock every year from all parts of the civilised world to gaze upon the picturesque beauties of the Highlands, to muse among the ruined aisles of Iona, or to listen to the diapason of the sea, as it sinks and swells through the pillared caves of Staffa, few, comparatively speaking, care to go so far north as the Shetlands; yet these islands, though generally bare, have a beauty of their own—the breezy, ever-changeable beauty of the sea.

The scientific tourist will not fail to find something to interest him in Shetland. There are bold headlands, wide reefs of black crags, and a flora which, although neither rich nor varied, has charms for the botanist. There are broad stretches of sandy beach, not so sterile as they look, but affording, in hidden nooks and crannies, no bad hunting-ground for a naturalist out for a summer holiday. If you are a member of the Alpine Club, there are here no mountains for you to climb, but there are cliffs such as might

well appal the most practised mountaineer; and in summer there is the sun, shining in a cloudless sky nearly all through the four-and-twenty hours. There in summer, midnight is not like the midnights of more southern climes, but is permeated by the rays of a sun, set indeed, but so soon about to rise, that there is scarcely any absence of light.

If you are a painter, you may have sea-views in abundance. You may choose your own time and place and grouping; early morning if you will, with the white mists rolling in over the shimmering sea, and the clamorous gulls hovering above skerries that are crusted all over with dense clinging masses of sea-weed. Or you may wait till the ascending sun rolls back the curtain of mist, and the sea gleams out before you a wide sheet of burnished gold, spangled with the rocky islets of a storm-swept archipelago. The waves roll in at your feet—long majestic ridges of water, dappled with lines of foam; the wide swell of the Atlantic sweeping in from the far shores of Labrador; while from far inland some tiny streamlet tumbles down to the sea through a natural copsewood of dwarf ash and birch and hazel.

Bold points and headlands stand like brave sentinels far out to sea, sheltering little natural harbours where the fisherman's boat rides in safety. Tiny fiords run inland into deep glens, with here and there a fisherman's hut or a crofter's cottage. Perhaps, however, you may have a fancy for foul weather, when the sky darkens like a pall over the sea, and the storm-fiend rouses himself from his ocean lair, and the tempest-tossed waves scud along in wreaths of foam to break in hoarse thunder upon the shore, or hurl themselves in impotent rage against the face of the steep headland. In Shetland you have grand alternations of calm and storm.

It is perhaps, however, for the student of human nature that Shetland has the greatest attractions. Here he will find a simple, kindly, primitive set of people, of Norwegian descent, but now anglicised in language and usages. They are, however, fond of old legends and stories. Mrs Saxby, the authoress of *Rockbound, a Story of the Shetland Isles*, in a pleasantly told narrative introduces us to this primitive people. We have for the scene of the story an island called Vaalafiel, five miles long, and a little over two in width, with a tiny harbour, and gray old mansion-house set in a strip of scraggy pine-wood. Vaalafiel, Mrs Saxby tells us, 'is coiled upon the sea much in the way a kitten rolls itself together on the hearth-rug—the creature's paws being represented by the narrow belts of land overlapping each other and forming the arms of our voe (fiord), whose crags are very suggestive of claws. Rising abruptly from the shores of this harbour, the island becomes a hill, whose eastern side is a precipice dipping into the German Ocean. The north point terminates in a bold headland, from whence the hill slopes gradually southwards, until it ends in a beautiful stretch of sand, kissed white by the broad waves of the Atlantic. The neighbouring islands cluster north and south, leaving deep narrow channels, where the two great seas keep up a perpetual warfare; and he is a daring sailor who ventures to cross those tideways when their "dark hour" approaches.'

Under the old house of Vaalafiel and the cliffs adjacent to it were wide underground caverns,

such as in the 'good old smuggling times' were no uncommon adjuncts to country houses, and even manse, if they happened to be conveniently near the shore. This smugglers' cave was the scene of a tragedy, such as was of no unfrequent occurrence among desperate men in these lawless days. A hasty blow struck in sudden passion hurried one rash soul to its last account, and darkened as with the brand of Cain the lives of many others. There is an old nurse, full of well-nigh forgotten Norse superstitions, and a little lonely child, the heiress of the rockbound islet, whose dearest pleasure was to watch the sea on the serene summer evenings when the sky became like a poet's dream, and earth and sea put on the glory of the clouds. Mrs Saxby describes 'the Shetland summer night as not dark at all; it is merely a twilight, which is prolonged sufficiently to assume a character of its own. Not dark, not light, not a brief uncertain mingling of both, but a quiet earnest period of rest, when Nature dreams but does not sleep, and yet is not awake. We call it "the dim," and you can discern objects quite clearly while it broods over the earth.' The wild winter nights have a grand storm-driven beauty of their own, when the Aurora Borealis shoots forth a fitful light, and the nursing of the gray North 'catches glimpses of the beauty dwelling in colour.' The solitary child Inga, bearing in her brave little heart the burden of her father's dimly realised crime, yet cleaving to him, because he loves her, with an affection far stronger than that which binds her to her cold unloving mother, develops into a healthy spirited girl. Lonely and prosaic as her life was, it was not, however, without a salutary admixture of holidays and holiday amusements. The lady of Vaalafiel, although a somewhat stern disciplinarian, was wise enough to recognise the truth of the axiom, that 'all work and no play make Jack a dull boy,' and so upon birthdays and such kindred anniversaries she somewhat relaxed the rigidity of her rule. A fat bullock was killed in honour of the young heiress, and Miss Inga's favourite Newfoundland dog ('evidently desirous of contributing his share to the feast) went off one night to the hills and ran down half-a-dozen sheep. It was found that he had performed the service of a butcher in a perfectly scientific manner; so the animals were carried home and added to the larder.'

With such a superabundance of *pièces de résistance*, even the crustiest old bachelor in the world might have found a picnic tolerably enjoyable; and Miss Inga and her young friends had a most delightful day of it in their sweet northern Arcadia, clad as it then was in all its witching garb of summer. 'The sun,' she says, 'rose in cloudless glory, and everything was dipped in sunshine of another kind as well; for Aytoun' (a divinity student quite as fascinating as *The Modern Minister*) 'had returned for the midsummer vacation, and that would have been gladness enough for me. There were with him some of his college companions, who made sparkling speeches, sang hearty songs, assisted in distributing prizes to the winning boats, and then challenged the islanders to a football match. Which played best is an undecided question to this day, for each side had a method of its own, and did not comprehend that of its opponent. Then the people were gathered on a smooth meadow near our house, and the plaintive

Foula Reel called upon old and young alike to join in the graceful and truly poetic dance of Shetland. The natural good breeding of the islanders allowed us to remove every restriction on their pleasure, which was characterised by a hearty enjoyment without the slightest approach to excess.

As unlike as possible to a heroine of romance, the child reared in this homely fashion is yet sweet enough to carry blessing and love wherever she goes; to heal old wounds with her simple beauty and goodness; to carry peace into the unforgiving relentlessness of her mother's heart; and to efface the blackness of her father's crime (justifiable homicide, a soft-hearted jury would resolve it into) with tender penitential tears. Miss Inga is in truth a very lovable character, innocent, simple, and yet intelligent; gentle and winning in her ways, although she can be spirited and resolute upon occasion; full of affectionate respect for her stern mother, and of deep romantic devotion for her father, for whose sake she marries without love, which no properly constituted heroine of romance ever does or can do, but which many a good woman has done, to find, as she did, peace and household joy and contentment at a good man's hearth.

Many of the descriptive passages in *Rockbound* are written with considerable vividness and effect, as for instance the storm, through whose agency a crisis in the plot of the tale is worked out. 'A tempestuous morning was breaking, and sea and wind were uttering wrathful warnings of what might befall the unwary fishers who were out on the deep, and I looked out with eyes which scarcely saw—with a mind on which impressions seemed lost. As if still in a dream, I beheld the furious waves come rolling majestically from the far deep and break with thundering sound upon the rocky arms of our voe. As I gazed, there suddenly appeared round a point of the high land a little vessel with closely reefed sails struggling in the sea between Vaalafiel and its neighbouring island. Her hull was partially concealed from my view by the arms of our voe, but very soon I seemed to know that it must be the *Seamew*, and that she was attempting to enter the harbour; and a thought occurred to me which was suggestive of peril at once: Why do they try to pass through so narrow and dangerous a strait when the storm is at its worst? As if in answer to my thought, the vessel hoisted a flag of distress, probably with a forlorn hope that some wakeful eye might see it, and then she lay to, as trying to advance in the very teeth of the gale. My father, everything, was forgotten in that breathless moment, as I watched my tiny ship thus turn, pause, and enter the rocky path beset by death. She was evidently being driven by cruel necessity to dare so hazardous a piece of navigation, and I soon discerned that she was no longer manageable. Just then a gust of wind still more furious than before caught her at a critical moment, and in less time than I say the words in, she was tossing among some detached rocks at the entrance to the harbour, a total wreck, and likely to go down every instant.

'I had stood terror-bound till then; but the sight of figures clinging to the spars stirred me to action, and I flew to arouse our servants. They were soon hurrying to the neighbouring cottages, in hope of assistance from any men who chanced to be at

home; and I ran along the shore until I reached the crags opposite where the disabled yacht lay. I was soon joined there by numerous women and a few old feeble men, who shook their heads and groaned when I frantically implored them to launch a boat and go to the rescue. "There's no an able-bodied man in the island wha kens hoo to handle an oar," they cried; "oor men are a' at the haaf" (deep-sea fishing). "The Lord preserve them this awfu' hoor."

Then for a touch of simple pathos, take the neglected child's scanty recollections of her unloved childhood: 'One of the few things I remember is that I always wore a black frock. This circumstance is impressed on my mind, because I had, and still have, a perfect passion for rich gorgeous colours. Nature in the gray North seldom gave my eyes a feast of radiant hues; no brilliant butterflies and flowers clothing the earth in the garments of heaven; no winter clusters of red berries and wreaths of evergreen. There were some old pictures in the house in which scarlet shawls and purple curtains played a prominent part, and I spent a large portion of the time usually devoted to sleep by sensible children in admiring these, and conjuring up fantastic histories of each portrait.'

Altogether, the book is sweet, fresh, tender-hearted, like a whiff of the foaming ocean spray, quite out of the hackneyed round, and yet sufficiently realistic to impress the reader with a conviction that it is the record of a life which has been lived, which, if not the highest aim of the novelist's art, is yet an indispensable adjunct to it. We have only to add that Shetland is now easily reached by regular steamers plying between Granton (Edinburgh) and Lerwick, the capital of the islands; while we believe a small steamer plies from Lerwick for local accommodation. A summer cruise in a yacht would, however, be the perfection of voyaging for the purpose not only of seeing Shetland, but Orkney and various intermediate islands, such as Fair Isle and Foula, which are out of the way of general traffic. To visit these distant fragments of land in the north, forming the scene of Scott's vivid romance of *The Pirate*, would furnish a new sensation never to be forgotten.

THE MONTH:

SCIENCE AND ARTS.

THE Report of the meeting of the British Association held last year at Glasgow has just been published in a goodly volume of more than three hundred pages. Among its contents are Reports of Committees, of which it may be said that the more widely they are known the better; and bearing in mind recent disasters at sea, the Investigation of the Steering Qualities of Ships by Professor Osborne Reynolds of Owens College, Manchester, appears the more interesting. 'The experiments of the Committee on large ships,' he remarks, 'have completely established the fact, that the reversing of the screw of a vessel with full way on, very much diminishes her steering power, and reverses what little it leaves; so that where a collision is imminent, to reverse the screw and use the rudder as if the ship would answer to it in the usual manner, is a certain way of bringing about the collision.' This is an important

fact, for it is well known that collisions have been occasioned by the very means made use of to avoid them. And Professor Reynolds says further: 'It appears that a ship will turn faster, and for an angle of thirty degrees, in less room when driving full speed ahead, than with her engines reversed, even if the rudder is rightly used. Thus when an obstacle is too near to admit of stopping the ship, then the only chance is to keep the engines on full speed ahead, and so give the rudder an opportunity of doing its work. These general laws are of the greatest importance, but they apply in different degrees to different ships; and each commander should determine for himself how his ship will behave. . . It is also highly important that the effect of the reversal of the screw should be generally recognised, particularly in the law courts; for in the present state of opinion on the subject, there can be no doubt that judgment would go against any commander who had steamed on ahead, knowing that by so doing he had the best chance of avoiding a collision.'

The statements thus set forth are illustrated by diagrams which shew the position of the vessel after reversal of the screw, and the position after steaming ahead. The latter shews that collision would be entirely avoided.

We frequently read that in future sea-fights the ram will be relied on for running down enemy's ships and sending them to the bottom. But where is the captain at the present day who has had experience of ramming, and of other evolutions which will be required in a fleet of steam ironclads under quite new conditions? Soldiers can go into temporary camps and get experience in 'autumn manoeuvres'; but sailors cannot have mock-actions and run down ships which cost half a million sterling, nor venture to try the eighty-ton-gun on their consorts. Hence there will be very much to learn in the first great naval battle.

Under these circumstances, Professor Reynolds recommends that small steam-launches should be built of wood, each representing the exact form of one of our large ships, and that with these all possible manoeuvres should be carried out, and officers make themselves familiar with all the effects of the screw on the rudder, with all the conditions of steering, with all the evolutions requisite to bring about or to avoid a collision, and with the effects of ramming. If strongly built of wood, these little vessels would withstand an experimental blow from the ram.

The value of such experiments would be real, for it is now known that the behaviour of a small copy of a ship is exactly the same as that of the great ship, in proportion to the size. The waves set up by the launch bear the same relation to her size as the waves of the ship do to the ship. The recognition of this law marks an epoch in the progress of naval architecture. Given a model, Mr Froude 'can now predict with certainty the comparative and actual resistance of ships before they are constructed.'

The Report of the Committee for investigating the circulation of the underground waters in the New Red Sandstone and Permian formations of England, and the quantity and character of the water supplied to various towns and districts from these formations, conveys information interesting to everybody—for everybody drinks. At Liver-

pool there are wells sunk in the New Red Sandstone which yield more than seven million gallons daily; at Birkenhead the same; at Coventry, Birmingham, and Leamington four millions and a half; at Nottingham nearly four millions; and at Warrington and Stockport more than a million and a half gallons every day. The total makes up a large quantity; but it is nothing in comparison with the supply which the whole area of the New Red may be expected to furnish. This area, says the Report, is certainly not less than ten thousand square miles in extent in England and Wales, with an average rainfall of thirty inches, of which certainly never less than ten inches per annum percolates the ground, which would give an absorption of water amounting to no less than one hundred and forty-three millions three hundred and thirty-six thousand gallons per square mile per annum; which, on an available area of ten thousand square miles, gives an annual absorption of nearly a billion and a half of gallons in England and Wales. As if to heighten the effect of this good news, we are told the 'New Red Sandstone Rock constitutes one of the most effective filtering media known. . . It exerts a powerful oxidising influence on the dissolved organic matter, which percolates it to such an extent, that in the waters of certain deep wells, every trace of organic matters is converted into innocuous mineral compounds.' And again: 'Waters drawn from deep wells in the New Red Sandstone are almost invariably clear, sparkling, and palatable, and are among the best and most wholesome waters for domestic supply in Great Britain.' After reading this, may we not say that Undermere, about which no one will quarrel, is the lake whence great towns in the north should draw their water supply?

During the meeting of the British Association at Plymouth last August, the Mineralogical Society held their second annual gathering under the presidency of Mr Sorby, F.R.S., who in his address gave an account of a new method for determining the index of refraction of minerals, which can be readily employed in their identification. This seems a dry subject; but it is one likely to be valuable and interesting to mineralogists and chemists, and to lead to an entirely new branch of mineralogical study, and to the discovery of a new class of optical properties of crystals. For a proper understanding of the method, a knowledge of optics, of mathematics, and other branches of science would be necessary; but we may state generally that it is based on the fact, that if an object, when placed in focus for examination on the stage of a microscope, is covered with a plate of some highly refracting substance, the focal length is increased; in other words, the microscope must be raised a little farther from the object in order to restore the focus. The distance to which the microscope has been moved thus becomes a measure, which can be accurately determined on a scale to thousandths of an inch. By this measure, therefore, very minute differences of refraction can be determined, and the several minerals identified; and Mr Sorby, in conjunction with Professor Stokes, Sec. R.S., has arrived at certain definite conclusions, which, embodied in numerical tables, may ere long be consulted by all interested in the subject.

On this point Mr Sorby explained in his address: 'On applying this method to the study of various

minerals, the difference is found to be very great. We can mostly at once see whether they give a single unifocal image or one or two bifocal images, and form a very good opinion respecting the intensity of the double refraction, and easily determine whether it is positive or negative. . . . These facts combined furnish data so characteristic of the individual minerals, that it would usually be difficult to find two approximately similar. . . . It has been said that in studying the microscopical structure of rocks it is often difficult to distinguish nepheline from apatite. But the index of nepheline is about 1.53, whereas that of apatite is 1.64, and such a considerable difference could easily be recognised in a section not less than one-fiftieth of an inch in thickness.

The observations hitherto made prove that minerals may be ranged in classes according to their refracting power and their chemical composition. The fluorides are lowest in the scale, while quartz, corundum, the sulphides and arsenides, are among the highest. From these particulars it will be understood that researches into mineralogy have a prospect of becoming more and more interesting.

As we have a British Association for the Advancement of Science, so our neighbours across the Channel have a French Association. It met last August at Havre, and in a few of its fifteen sections manifested signs of activity. Among the meteorologists, diagrams were exhibited shewing clearly that the 'changes of pressure in the upper regions of the atmosphere are by no means similar to those at the surface of the earth; for when the pressure at the lower station decreases, it rises at the upper station, and the reverse; or when it is steady at the one, it rises or falls at the other.' A line of telegraph for meteorological purposes is now erected from Bagnères to the Pic du Midi, seventeen miles. The Pic is nine thousand feet high, and will be an interesting observing station, in constant communication with the lower regions. A proposition was made that the Transatlantic steam-ship companies should be requested to institute regular meteorological observations on board their vessels; and that the captive balloon of next year's Great Exhibition at Paris should be an observing station. Paris is chosen as the meeting-place of the Association for next year, and at the same time a free international meteorological congress will be held.

During recent years it has been said that the marshes and saltish depressions in the territory of Algiers and other parts of North Africa were once covered by the sea, and schemes have been announced for readmitting the sea by cutting channels from the Mediterranean. Mr Le Châtelier, a French chemist, says—the existence of the salts is not due to the drying up of a former sea, but to the masses of rock-salt which exist in the mountains. From these the salt is dissolved out by rain or by subterranean waters, and the saline solution percolates the soil to feed the artesian reservoirs which underlie the desert. These observations will require attention from geographers.

If any apology were required for a somewhat late notice of Dr Sayre's method of rectifying curvature of the spine, it would be found in the fact that among the arts the healing art holds an eminent place, and has special claims on every one's attention. Dr Sayre, an American, has this

year visited England to make known his method of curing those malformations of the backbone under which many persons remain cripples for the whole of their life; and now that it is known, the wonder is that it was not thought of before. In carrying out the operation, the patient is lifted from the ground, and suspended by a support under the chin and back of the head; sometimes a support is placed under the armpits, and sometimes the arms are raised. In this position the weight of the pelvis acts on the crook in the spine, and pulls it straight; a bandage dipped in plaster of Paris is then bound round the body; a few iron splints are inserted in the bandage, and as the plaster dries, a mould is formed, which keeps the straightened bones in place. The suspension is now at an end; the patient is found to be an inch or two inches taller than before the operation, and can walk without limping. After a few days, the plaster-mould is cut up each side, to allow of removal for washing the body; but the two halves are quickly replaced and held in position by a bandage. In some instances six months' wearing of the plaster-mould effects a cure, and the patient enjoys an ease and activity never before experienced.

This method of cure contrasts favourably with the treatment which keeps the patient supine many weary months. As may be imagined, it succeeds better with children than with adults; but even adults have been cured. A case occurred at Cork, the patient being a woman aged twenty-two, and requiring a little mechanical pulling to assist in the straightening; but it was accomplished, and she walked out of the room two inches taller than she entered it.

Mr Hoppe-Seyler, a learned German, has published a paper on Differences of Chemical Structure and of Digestion among Animals, supported by numerous examples, which shew that according to the organism so is the power to form differences of tissue; and he sums up thus: 'Looking at the question broadly, we find that the chemical composition of the tissues and the chemical functions of the organs present undoubted relations to the stages of development, which shew themselves in the zoological system, as well as in the early stages of development of each individual higher organism. These relations deserve further notice and investigation, and are qualified in many respects to prevent and correct errors in the classification of animals. It is generally supposed that the study of development is a purely morphological science, but it also presents a large field for chemical research.' This concluding sentence is significant, and should have serious consideration.

Waste pyrites from the manufacture of sulphuric acid is, as regards hardness, a good material for roads when mixed with gravel; but chemically it is not good. In the neighbourhood of Nienburg, Hanover, where roads and paths were covered with waste pyrites, it was found that grass and corn ceased to grow; and a farmer on mixing well-water with warm milk, observed that the milk curdled. The explanation is, that the waste pyrites 'contained not only sulphide of iron and earthy constituents, but also sulphide of zinc, and that by the influence of the oxygen of the atmosphere and the presence of water, these sulphides were gradually converted into the corresponding sulphates;' and these, continually extracted by the

rain-water, soaked into the soil, contaminated the wells, and produced other injurious effects.

The want of really efficient names to distinguish various kinds of manufactured iron has long been felt in the iron trade. The Philadelphia Exhibition gave rise to a Commission which, after discussion of the question, have recommended that all malleable compounds of iron similar to the substance called wrought-iron shall be called 'weld-iron;' that compounds similar to the product hitherto known as puddled steel, shall be called 'weld-steel;' that compounds which cannot be appreciably hardened when placed in water while red-hot shall be called 'ingot-iron;' and that compounds of this latter which from any cause are capable of being tempered, shall be called 'ingot-steel.'

By further exercise of his inventive abilities, Major Moncrieff has produced a hydro-pneumatic spring gun-carriage perfectly adapted for use in the field. A gun mounted on this carriage could be made ready for action within ten minutes after its arrival in the trenches.

The Science and Art Department have commenced the publication of a 'Universal Art Inventory, consisting of brief Notes of Fine and Ornamental Art executed before the year 1800 chiefly to be found in Europe.' This is a praiseworthy undertaking, for there are so many rarities of art which can never be seen by the multitude, which can never be moved from their place or purchased, that an inventory thereof with descriptive notes cannot fail to be of great utility. Nearly all the governments of Europe and many royal personages are co-operating in this work, which includes reproductions in possible instances. Some of these reproductions are well known to the frequenters of the South Kensington Museum; for example, the great mantel-piece from the Palais de Justice at Bruges; Trajan's Column from Rome; a Buddhist gateway from India, of the first century; a monument from Nuremberg, and other elaborate works. As a means of reference, this Inventory will be welcome to many a student, and as it necessarily will take many years to complete, there will be the pleasure of watching for fresh instalments of information. But all students should remember that 'the laws of design are as definite as those of language, with much the same questions as to order, relationship, construction or elegance; differing for dissimilar styles as for divers tongues. The pupil in design has similar obstacles to encounter with those of the schoolboy in his alphabet and grammar; the ability to use the pencil or the brush will no more produce an artist than the acquirement of the writing-master's art with Lindley Murray's rules will make a poet.'

Professor Justin Winsor, one of the American delegates to the conference of librarians held last month, points out with much earnestness that by the extension of libraries a great impetus may be given to national education, and an opening made at the same time for the employment of women. In America, pains have been taken to engage men and women in the work who are content to labour to attain the level of a far higher standard than the public at large have been usually willing to allow as the test of efficiency. 'We believe,' remarks the Professor, 'that libraries are in the highest sense public charities; that they are missionary enterprises; that it is to be supine if

we are simply willing to let them do their unassisted work; that it is their business to see two books read instead of one, and good books instead of bad. To this end it has been urged that one of our principal universities shall have a course of bibliography and training in library economy.'

In reply to various correspondents, we beg to state that the information regarding the manufacture of vegetable isinglass in Rouen, which appeared under the head of *A Few French Notes* in No. 717 of this *Journal*, was taken from *L'Armée Scientifique*, a work compiled by the well-known French savant, M. L. Figuier. As there seems to be some difficulty in reconciling M. Figuier's statements with the present state of the process as carried on in France, we are making further inquiry, and hope to be able to give early and definite information.

A FEARFUL SWING.

THE 'Shaftmen' at our collieries are selected for their physical strength and pluck, in addition to the skill and practical knowledge required for their particular work. The incident we are about to relate will shew how severely the former of these qualifications may at times be tested.

The work of these men is confined to the shaft of the pit, and consists mainly in repairing the 'tubbing' or lining of the shaft, stopping leaks, or removing any obstructions interfering with the free passage of the cages up and down the pit. The coal-pit at N— has a double shaft, divided by a 'bratticeing' or wooden partition. These divisions we will call A and B. Two cages (the vehicles of transport up and down the pit) ascend and descend alternately in shaft A. At a certain point the shaft is widened, to allow the cages to pass each other, and their simultaneous arrival at this point is insured by the arrangement of the wire-ropes on the winding-wheels over the pit-mouth. The oscillation of the cages is guarded against by wooden guiders running down each side of the shaft, which fit into grooves in the sides of the cage.

On one occasion during a very severe frost these guiders had become coated with ice, and thus their free passage in the grooves of the cages was interfered with. Before this obstruction was discovered, the engine having been set in motion, the downward cage, which fortunately was empty at the time, stuck fast in the shaft before arriving at the passing-point. The ascending cage, whose only occupant was a small boy returning to 'bank,' proceeding on its upward course, crashed into the downward cage in the narrow part of the shaft, where of course there was only a single passage. Though the shock was something terrific, the steel rope was not broken; as the engineman, whose responsible position entails the greatest presence of mind and watchfulness, had stopped the engine on the first indication of an unusual tremor in the rope. Yet such was the violence of the meeting, that both cages, though strongly constructed of iron, were bent and broken—in fact rendered useless—by being thus jammed together in a narrow space. The greatest anxiety was felt as to the fate of the boy, as it was seen that even if he had escaped with his life after such a severe crash, his rescue would be a work of great danger and difficulty.

We may imagine the horror of the poor little fellow while suspended in the shattered cage over a gulf some four hundred feet deep, both cages firmly wedged in the shaft, and the ropes rendered useless for any means of descent to the scene of the catastrophe. The readiest way of approach seemed to be by shaft B, the position of which we have indicated above. Down this then, a Shaftman, whom we will call Johnson, descended in a cage until he arrived at an opening in the brattice-work by which he could enter shaft A. He found himself (as he supposed) at a point a little above where the accident had occurred; and this conclusion he came to from seeing two ropes leading downwards, which he naturally took to be those by which the cages were suspended. Under this impression he formed the design of sliding down one of the ropes, with a view to liberating, if possible, the entangled cages and securing the safety of the unfortunate boy. The hardy fellow was soon gliding through the darkness on his brave and dangerous errand. He had descended about forty feet, when, to his horror and amazement, his course was suddenly checked by a bend in the rope; and the terrible discovery flashed upon him, that he was *suspended in the loop of the slack rope*, which here took a return course to the top of the downward cage!

It will be understood that when the descending cage stuck upon the runners, as the rope continued to unwind from the pulley it hung down in a loop, descending lower and lower, until the engine was stopped by the meeting of the cages. This loop or 'bight' was naturally mistaken by Johnson for the *two ropes*, and he did not discover until he found himself in the fearful situation described, that he had entered through the brattice into shaft A *below* instead of above where the cages were fixed. There he hung then, over a yawning abyss many fathoms deep—closed from above by the locked cages—all below looming dark and horrible.

None of course knew his danger; his hands were chilled by the freezing rope; his arms, already fully exercised, began to ache and stiffen with the strain and intense cold, added to the bewildering sense of hopeless peril. Good need there was then that pluck and endurance be found in the Shaftman! His square sturdy frame and unflinching spirit were now on their trial. Had his presence of mind gone or his nerve failed, he must have been paralysed with fear, lost his hold, and been dashed into an unrecognisable mass.

But self-preservation is a potent law, and working in such a spirit he framed a desperate plan for a struggle for life. The guiders running down the inside of the shaft are fastened on to cross-beams about six feet apart. Johnson hoped that if he could reach one of these, he might obtain a footing whereon to rest, and by their means clamber up to the opening in the brattice-work. How to reach them was the next question that flashed lightning-like through his brain. This he essayed to do by causing the rope to oscillate from side to side, hoping thus to bring himself within reach of one of the cross-beams. And now commenced a *fearful swing*. Gaining a lodgment with one knee in the loop, he set the rope swinging by the motion of his body, grasping out wildly with one hand each time he approached the side of the shaft. Once, twice, thrice! he felt the cold icy face of the 'tubbing,' but as yet nothing except

slimy boards met his grasp, affording no more hold than the glassy side of an iceberg. At last he touched a cross-beam, to which his iron muscles, now fully roused to their work, held on like a vice. He soon found footing on the beam below, and then letting go the treacherous rope, rested in comparative security before beginning the perilous ascent. With incredible endurance of nerve and muscle he clambered upward alongside the guider, by the aid of the cross-beams, and by thrusting his hands through the crevices of the timber. In this manner he reached the opening into shaft B, where the cage in which he had descended was waiting. Chilled, cramped, and frozen, and barely able to give the signal, he was drawn to the pit-mouth prostrate and exhausted. The boy was rescued unhurt by a man being lowered to the top of the cages in shaft A. Johnson suffered no ill consequences, and though a hero above many known to fame, he still pursues his hardy task as a Shaftman; while beneath the homely exterior still lives the pluck and sinew of iron that did not fail him even in his Fearful Swing.

TO MY ROBIN REDBREAST.

The following lines are taken from *The Captive Chief, a Tale of Flooden Field*, by James Thomson (H. H. Blair, Alnwick, 1871).

Now keenly blows the northern blast;
Like winter hail the leaves fall fast,
And my pet Robin's come at last
To our old thorn;
With warbling throat and eye upcast
He greets the morn;

Like some true friend you come to cheer,
When all around is dark and drear.
And oh! what friend to me more dear
Than your sweet self?
Your mellow voice falls on my ear
Like some sweet spell.

Oft at the gloaming's pensive hour,
When clouds above me darkly lower,
I've sought a seat in some lone bower,
With heart oppress;
You soothed me with your magic power,
And calmed my breast.

When Morning dons her sober gray
To usher in the coming day,
And Phœbus shines with sickly ray
On all around,
No warblers greet him from the spray
With joyous sound.

But you, sweet bird, unlike the throng,
Salute him with a joyous song.
When heavy rains and sleet prolong
The dreary day,
You chant to him your evening song
Upon the spray.

No blackbird whistles in the grove,
Where late in chorus sweet they strove;
No warbler's tongue is heard to move,
But all is sad;
No cushat woos his amorous love
In hazel glade.

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